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Book Review

A Chromatic Fantasy and Fugue in Immunology

Immunobiology: The Immune System in Health and Disease.
By Charles Janeway and Paul Travers.
New York: Garland Publishing. (1994). $60.00 hardcover; $33.95 paperback.

Immunology teaching is a treat and a challenge: the subject is constantly changing with new concepts and an avalanche of facts, as well as revising its own essential paradigms many times each decade. The pleasure in teaching the subject is that our lectures are forever undergoing revision, making for intensified notetaking at seminars and broad reading. Furthermore, the curriculum itself needs attention annually as certain subjects no longer can squeeze into a course, and we glean an overall feeling of satisfaction in successfully keeping up with the advancing front of knowledge and communicating the excitement that we experience to our students. In much of the curriculum of modern biology, students are repeatedly exposed to several key concepts, such as the relationship of DNA, RNA, and protein synthesis; but in teaching immunology, the clay has not been previously molded, and the instructor has the challenge of making the initial imprint meaningful, correct, and well balanced.

The greatest challenge has always been to find the appropriate textbook. This has not been easy in immunology, because of the rapidity of change in so many areas such as antigen processing and presentation or apoptosis (just to start with the A's) and owing to the fact that the subject is inherently a very broad one covering many subdisciplines: therefore, suitable textbooks are as rare as the woolly rhinoceros. The right level has been one problem, because some texts are too simplistic or uninformed about many of the true current issues in this area, while others may be wonderful for graduate students and professionals, extending a rich context of information and experiment by experts in each field. The correct balance is another problem, with some authors stressing immunopathology, others T and B cell repertoires, and some omitting any reference to regulatory immunology and the intricacies of the network or suppressor T cells. Other tomes are too stodgy and dull to keep the student or the instructor free of Lethe's embrace. From the perspective of this visually centered reviewer, the naive immunology student ideally should be exposed to this plethora of material in a variety of forms—listening to clarifying lectures with many visual props in the use of slides and the chalkboard, well buttressed by a readable text, animated with lively illustrations that fix concepts in the mind.

A textbook meeting all of these criteria has recently been published by Garland Publishing—*Immunobiology: The Immune System in Health and Disease*, by Charles Janeway and Paul Travers, with copious figures designed by Celia Wellcome. The figures are brighter and in more captivating colors than in any previous immunology text, sometimes 10 colors in a single illustration. (However, the prototype of a copiously illustrated text is found in the three editions of Roitt et al. called *Immunology*). The first flip through the pages of *Immunobiology* makes it clear that the figures in this text will be frequent, will be central to the story line, and will feature legends that are an integral and necessary part of the whole. An early example of a potent figure, Figure 1.18, shows three types of antigen-presenting cells—B lymphocytes, macrophages and dendritic cells—and each type is pictured as cartoon, in the light microscope version and by transmission electron microscopy as well as scanning electron microscopy—a marvelous introduction and summary and indescribable in words. (However, I would have profited from an arrow pointing out the scanning electron microscopy dendritic cell—is it that cell covered with *orechiette* or *farfalle* pasta?) Particularly excellent also is Figure 10.5, demonstrating the two polar forms of leprosy with histological views, explanatory tables, and mRNA (Northern) dot blots showing Th1 and Th2 cytokine patterns in tuberculoid and lepromatous leprosy, finally followed by a clarifying cartoon depicting possible mechanisms—a tour de force, and the book is filled with them. In some figures, such as the beautiful Figure 4.23 illustrating mechanisms of gene conversion during evolution, or Figure 8.38, showing the sequential pathway of complement activation, color itself in the diagrammatic presentation is used to splendid advantage. The authors have grasped the central lesson in communication in this visual age, as well as in the Confucian period, that a picture or diagram can illustrate, concertize, explicate, and synthesize, as paragraphs of text may fail to do. Thus, the figures do contain the heart of the subject, both conceptual and experimental. Once having studied such exemplary figures as Figure 2.35 showing the relative proportions of lymphocyte subpopulations in various tissues, the imprint in one's memory is indelible. Without exception, in the short evaluations I asked of UCLA students in the undergraduate advanced immunology course about their Janeway–Travers text, the colorful figures were pointed to as a major positive feature of the text. They also loved the appendices starring favorite CDs and cytokines.

In fact, it is not surprising that several students in the class wrote that they mostly looked at the figures and legends and consulted the text rarely, and then via the index. Pity! Such students really missed out and didn't derive maximum value for their investment, because the presentation in the text is clear, concise, and loaded with experiments and the added spice of the authors' viewpoints. It is an easy and entertaining read. This is a volume with a clear guiding principle, that the immune response is dedicated to the protection of the individual from infection. Thus, the functional biology and physiology of every structure are always brought forward where relevant. This is a

field in which many of the advances now involve reductionist analysis at the molecular level or in vitro analysis using cellular assays. Janeway and Travers never let us forget that the ultimate test involves efficacy of the in vivo model and of the intact immune system. They use their summaries to drive home such important messages.

The book is organized into five parts, with an overall introduction to cells/molecules/organs, recognition, lymphocyte development, and B and T cell responses, finishing with the involvement of the immune system in health and disease, setting all issues regarding the absence of infection (allergy, transplantation, and autoimmunity/self-reactivity) in a separate chapter. Each chapter is in modular form, comprised of three or four key sections, within which each highly focused page-long module is accompanied by roughly one illustration. The modular headlines are in the form of declarative sentences, and each section as well as each chapter has a brief but valuable summary. Presumably, some modules can remain unchanged until eternity while others may undergo significant changes before the subject finally reaches maturity over the course of the annual rewrites. The promised annual editions will surely tax the authors, but it is a worthwhile endeavor to maintain up-to-the-minute currency in this field, and its vitality will surely guarantee a top position among available texts. The modular structure should have allowed a loose-leaf format with the exchange of certain pages annually.

Many experimental systems are described in the course of each of the chapters. In no case is there direct attribution to the investigators involved, although the excellently chosen and recent modular reference lists could be consulted for further reading. (It would seem that sufficient space is available, at least under figure legends for citing the author and the source of the experiment shown.) This may be a flaw that would affect new but mature readers from a different discipline who want to turn immediately to the original or related articles. Although the connection to the source paper and authors is severed, the style throughout presents a direct and concise explication of the original experiments, along with necessary introductory material and a full description of the implications of the work. Sometimes the authors even suggest future experiments!

It is easy to follow the direction of the intellectual arguments, but it is somewhat harder to find yourself within the book. The page numbers at the top of each page are written as 1:24 (chapter 1, page 24), while each module is given a different number, for example 1-15 (the differentiating dash is important), and the third number on page 1:24 is Figure 1.26. It doesn't take long to acquaint oneself with the scheme, but a less subtle possibility would be giving each chapter a Roman numeral and an actual page number—for example, III-137 substituting for 3:19. Using the present method, the summary to part I of the book and the introduction to part II, among others, lie in some no-man's land, pageless.

To point out another minor failing, when the figures are a chief attraction of a book, it becomes necessary to pay special attention to their implications, to structural ambiguities in the shapes and modes of interactions, as well as to subtle changes in color. I will cite only one example. In Figure 11.41, T cells from an immunized mouse are transferred to a new syngeneic mouse: the authors/illustrator choose to change the color of the mouse, which falls outside the implied convention that syngeneic animals should be of the same color. Some other way could be found to distinguish the new recipient of syngeneic tissue. Also in this figure, spinal cord homogenate in complete Freund's adjuvant is shown being injected into the tail vein, which surely would never be done in reality. Other mice in separate figures are injected in different places on the body—no standard convention is used. Rare figures have a wrong legend, and in other cases, the legend title doesn't actually describe the experiments shown.

One further problem I noted was the index, which, although quite thorough in certain areas, is insufficiently cross-referenced, especially to the figures. For example, in Figure 5.10, its legend, and the surrounding text, there appears interesting information about the regulation of RNA transcription from immunoglobulin gene segments, but there are no listings for either "enhancer" or "promoter" in the index (one must look for "immunoglobulin molecule—gene enhancer"). Likewise, such useful terms as "CD45 isoforms" could be added to the index along with CD45RA and RO, only known to the cognoscenti.

In summary, the Janeway–Travers text represents an excellent place to start thinking about immunology either for the *Cell* reader or the undergraduate. The former should not expect a thorough exploration of any one problem—this is not its avowed intent; but using the carefully selected bibliography and authoritative review(s), the sophisticated nonimmunologist should readily reach a frontline level. The latter will also gain a graphic, lively, and sound introduction to the whole realm of immunobiology; supplemented with a judicious choice of extra readings, to explore the details of landmark experiments thoroughly, the undergraduate should also thrive.

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